

Pneubotics - Membrane-Based Robotics for Remote Material Handling, Phase II

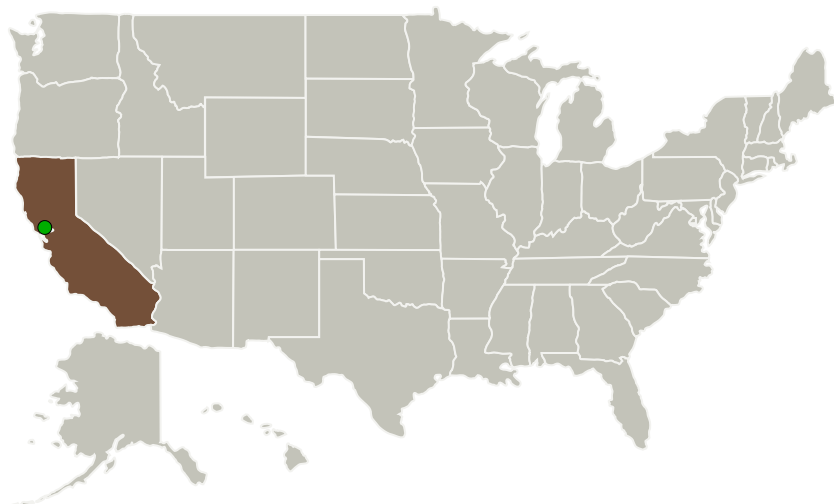
Completed Technology Project (2015 - 2017)



Project Introduction

We have invented a new class of robotics, called 'Pneubotics', that rival current manipulators in payload and reach at 1/10th the weight. Our technology leverages insights into lightweight materials and mass manufacturing to create robots that derive power, structure, and movement from pressurized air. As a result, drive trains, motors, bearings, shafts, sliding surfaces, and excess structural material are eliminated, leading to robots with extremely high strength to weight ratios, inherently human safe operation, and high degrees of freedom at low part count. This transformative new technology has the potential to enable the widespread use of automated handling of material and equipment on missions in low Earth orbit and beyond. The compliant nature of these robotic systems allows them to robustly grasp arbitrarily shaped objects and makes them ideal for operating around sensitive equipment and materials or cooperatively with humans. Similarly, due to their fluidic architecture they can be deflated and stowed for efficient transport. The work described in this phase II SBIR proposal would integrate the component development and analysis performed in Phase I to build and test a full prototype manipulation system. By incorporating optical, internal, and tactile sensors and multi-level controls that take advantage of the unique characteristics of the manipulator and seek out appropriate contact to guide motion rather than avoiding it. By testing the entire prototype system in the field we will demonstrate operation in the ground environment and learn valuable lessons for IVA and EVA applications.

Primary U.S. Work Locations and Key Partners



Pneubotics - Membrane-Based Robotics for Remote Material Handling, Phase II Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
Otherlab, Inc.	Lead Organization	Industry	San Francisco, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California

Project Transitions

July 2015: Project Start

June 2017: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137415>)

Images



Briefing Chart Image

Pneubotics - Membrane-Based Robotics for Remote Material Handling, Phase II Briefing Chart Image
(<https://techport.nasa.gov/image/135108>)



Final Summary Chart Image

Pneubotics - Membrane-Based Robotics for Remote Material Handling, Phase II Project Image
(<https://techport.nasa.gov/image/126179>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Otherlab, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

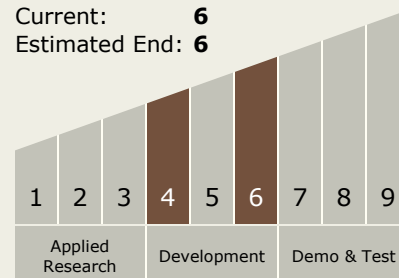
Carlos Torrez

Principal Investigator:

Kevin B Albert

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



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Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.3 Manipulation
 - └ TX04.3.3 Contact Dynamics Modeling

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System